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ABSTRACT

Establishing customer requirements spans two steps in the planning for quality set forth by Juran (1988), those of discovering customer needs and expectations and translating them into the language of those responsible for meeting the needs. The need for training was documented in a large, decentralized service organization through qualitative analysis of data from a sample of 98 problem-solving team members. Stratified snowball sampling combined with three qualitative data gathering methods identified the tasks and flow of this portion of the quality improvement process. It is concluded that: (1) implementation of any quality improvement process cannot be taken for granted once the basic concepts and problem-solving tools have been learned; (2) establishing customer requirements is essentially the same with internal and external customers; (3) establishing customer requirements extended and customized quality function deployment (QFD); (4) QFD extended the process for establishing requirements by adding options as it informed the instructional analysis; and (5) processes of task and instructional analysis are in themselves QFD. Two figures illustrate the discussion. (Contains 9 references.) (SLD)

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Establishing Customer Requirements: An Instructional Analysis for Continuous Quality Improvement Training Design

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Abstract

Establishing customer requirements spans two steps in the flow of planning for quality set forth by Juran (1988): those of discovering customers' needs and expectations and translating them into the language of the organizational unit or individual responsible for meeting those needs. The need for training was documented in a large, decentralized, service organization through qualitative analysis of data gathered from a purposive sample by multiple researchers. Stratified snowball sampling combined with three qualitative data gathering methods were used to identify the tasks and flow of this critical portion of the quality improvement process. Data are presented graphically and in text. Conclusions: 1) The implementation of any quality improvement process cannot be taken for granted once the basic concepts and problem solving tools have been learned; 2) the basic process of establishing customer requirements is essentially the same whether one is working with internal or external customers; 3) The task analysis of establishing customer requirements extended quality function deployment (QFD) by adding the dimension of negotiation and customized QFD for the organization in its own language; 4) QFD extended the process for establishing requirements by adding options for ranking or weighting and graphic representation and informed the instructional analysis, providing alternatives that are relatively simple to learn and implement; 5) The processes of task and instructional analysis are, themselves, forms of QFD.

Using Task and Instructional Analysis to Enhance Quality Function Deployment and Continuous Quality Improvement Training Design

As quality improvement in business and educational organizations moves from a topic of conversation to a mission to be accomplished, it becomes clear within those organizations that training is required—to redefine its culture almost as much as to give people the knowledge and skills necessary to complete the mission. This paper presents two things: The methodology used to create an instructional analysis of the tasks involved in a critical portion of the quality improvement process, and the outcomes of that analysis.

Establishing customer requirements spans two steps in the flow of planning for quality set forth by Juran (1988); those of discovering customers' needs and expectations and translating them into the language of the organizational unit or individual responsible for meeting those needs. Customer requirements become input for the assessment of quality indicators and for problem solving. A useful set of clear, measurable requirements, therefore, enhances assessment and may reduce the need for problem solving or facilitate the process when it is needed.

The setting in which this study took place is a large (over 10,000 employees) service organization with field offices across the nation. For purposes of this paper it will be called "Company X". Although it manufactures nothing, Company X specifies and maintains equipment in the service of its external customers. It employs people with a wide range of backgrounds, from a multitude of cultures, and with varying degrees of education (from eighth grade to PhD). Its decentralized structure allows autonomy for field-based decisions within certain established budgetary guidelines. Company X has its home office in the Southeastern U.S.A.

Company X embarked on the quality improvement journey in the late 1980s at the beginning of the latest economic recession. At the time the research was conducted, senior management at the home office had been trained in the basics of quality a la Phil Crosby, author of Quality is Free (1979). The concepts of quality, including continuous improvement and the customer-supplier relationship, had passed throughout the organization and had been incorporated into new-hire orientation. The president of the company had decreed that problem-solving (PS) teams would be formed in every field office and staff department. Training for PS teams was working its way through middle management and vertically through the organization as teams were formed and training was requested. As enough people were trained, cross-functional teams would also be formed. In the remainder of this paper are presented the methods and results of two qualitative studies. The first describes the specific needs for training. The second describes the task and instructional analysis.

Documenting the Need for Training

The strategy of the training department at this time was to conserve limited resources and create or buy training in quality improvement as needs were identified. The objective was to provide targeted training on a just-in-time basis. Thus, the training department staff (nine

professionals) was charged with documenting the most persistent and pervasive problems teams were encountering and to identify where training would have the most impact.

Method

Qualitative methods of data gathering and analysis were used to identify specific needs. A qualitative design took advantage of the existing relationship between the nine training professionals (a combination of trainers, organizational developers, and instructional designers) and their internal client base. At the time, 16 PS teams had been trained, 14 of which had generated lists of problems to solve and were in some stage of the problem solving process. Some had solved one problem and were working on another. The other two teams had just been trained and had not yet begun the problem solving process. Data sources consisted of PS team members (n=98 in 14 teams with an average of seven members each), the "top five" problem lists generated by PS teams in initial meetings, and reports from PS teams of problems solved (n=9). This purposive sample, then, consisted of all persons (line and staff) trained in problem solving methods who were participating in a current problem solving task or who had participated in one that was now complete.

Researcher bias was addressed through three types of triangulation: data, investigator, and methodological (Denzin, 1978). First, multiple data sources were used. The PS teams represented both large and small field offices across the U.S. serving both metropolitan areas and smaller towns which are linked by geographic proximity. Documents were used as well as the perspectives of team members for data triangulation. Second, multiple researchers gathered the data and assisted in the analysis. Four training/organization development internal consultants assigned either to the field or home office were the primary data gatherers. Data analysis was performed primarily by the lead researcher (an instructional designer) in collaboration with two other instructional designers, the data gatherers, and two training managers. Third, intensive interviewing of individuals and groups (focus groups) and document analysis were used as data gathering methods.

Inductive analysis was performed on the data using a cross-case strategy (Patton, 1990). Categories and sub-categories of problems to be solved by a cross-functional team were gleaned from problem lists, reports and team member interviews. These sub-categories became the focus for designing an intervention with the aim of enabling employees to better serve their internal and external customers.

Results

Three categories that emerged from the data included the following: customers, paperwork turnaround time, interface between departments. For purposes of this paper, only the category of customers will be discussed. It was, by far, the category containing the most data and included problems concerning external and internal customers. The over-arching theme within this category was serving the customer better. In some cases, the problems centered on figuring out what their customers really wanted. In others, it was the fact that customers were unhappy even though employees thought what they were doing was the right thing in the eyes of the customer.

This large category was further broken down into three sub-categories: identifying needs (N), execution (E), and capability (C). Problems regarding the identification of needs included those where there appeared to exist differences between what the customer expected and what the supplier(s) thought the customer expected and those mis-translations of customer needs into performance specifications, called an "action plan" in Company X. Execution problems included those where actual performance did not appear to live up to the action plan. Problems of a capability nature included those where promised capability exceeded actual capability due to mis-estimation or exaggeration. Examples below of customer related problems are coded for their sub-category:

> Reduce the number of customer complaints. (Problem list.) (N, C, E)
>
> "We don't seem to have a handle on some of customers. We get them okay, but keeping them is something else. It's like we can't do anything right for them. They're never satisfied." (Field employee.) (E, C)
>
> "The home office keeps asking for stuff [e.g., reports] from the field. We do it, send it, and no sooner turn around than we have to do it all over again--this time just a little bit different. I wish they'd get together down there on what they want. (Field employee) (N)
>
> Reduce amount of mis-specified equipment at this office. (Problem solving team report.) (N)
>
> "Get the customer's needs right the first time--before we start building the package of services for that customer." (Field employee.) (N)
>
> "Our customers should expect no down-time on account of us. After all, that's what we sell. But lately, we've missed the boat and customer down-time has increased." (Field employee.) (N, E)
>
> "Either we start living up to what our sales guys promise, or we keep them from making the promises in the first place. Some of those guys promise the world, and there's no way we can deliver..." (Field employee.) (C, E)
>
> "Data Processing spends a lot of time and effort writing programs that don't work--bugs, they call it. Well, I sure don't want to be working the bugs out of a computer while my guys (field sales representatives) have a line of people waiting to give them money. They should get the bugs out before they give [the system] to us!" (Home office employee) (E)

Based on these results, the decision was made by the study team to devise training to alleviate mis-identifying needs and mis-translating needs into an appropriate action plan. Organization development and other, non-training interventions were planned to alleviate execution problems and to increase capability; a strategy that provided help and the means by which the feasibility of training could be further investigated.

Task Analysis

Rationale

The overall goal of the training was to enable Company X employees as suppliers to, together with their customers, establish customer requirements with a process common to the organization that the full range of employees could use. To achieve this goal, the following steps were necessary: 1) Identify the tasks and flow of the process of establishing customer requirements within the organization (task analysis), 2) Identify within these tasks the critical skills and knowledge needed by the supplier to complete these tasks.

The astute reader at this time (if not before) may point out that teaching the use of a quality chart such as the "house of quality" technique that is part of quality function deployment (QFD) (Akao, 1990) would be a relatively simple way to achieve the goal. After all, the chart is fairly straightforward to construct when the process is broken down into composite steps (Hauser & Clausing, 1988; Maddux, Amos, & Wyskida, 1991). Akao himself (1993) cautions against playing it "by the book" in applying QFD, however, pointing out that every company is different and requires the use of imagination in finding suitable methods. He further cautions that "if applied incorrectly, [QFD] may increase work without producing the benefits" (p. 3). Teaching the use of a tool such as the quality chart out of context could lead to mis-application, a problem already encountered in Company X as a result of some well-meaning, but misguided attempts at using outside training consultants and packaged materials. It is also this author's experience that customers sometimes do not know what they need or are unable to articulate it well the first time. Quality charts do not address this. QFD and quality charts can, however, be used for comparison once the task analysis on establishing customer requirements is produced to ensure that critical steps are not missed. The task analysis also serves to customize quality efforts for the environment in which they must ultimately work.

Method

Sample. The strategy for generating and validating a task analysis involved the use of a small number of employees (key informants) who were knowledgeable and skillful with regard to the task. A stratified snowball (Patton, 1990) sample was selected because representation on certain dimensions was critical to developing training for a wide range of employees. These dimensions included geographic dispersion, educational background, type of facility (field versus home office), and type of customers served. For example, it was desirable to gather data from employees who only dealt with internal customers as well as from those who also served external customers. Thus, a sample of 17 Company X employees was drawn. The sample included ten men and seven women. Seven of the sample had completed college and nine had graduated from high school. The one participant who did not finish high school dropped out in the tenth grade. Five of the participants worked in various departments at the home office, while the other 12 worked in one of the field offices. Six of the employees came in direct contact with external customers in addition to those internal to the company. With the exception of a slight over-representation of women, the sample fairly depicts the company on the dimensions of interest.

Procedure. Intensive interviewing and participant observation by a known observer were the primary data gathering methods used in this study. Where appropriate and available, document analysis was also used. An interview guide was devised to promote consistency across multiple data gatherers. This author met with the other four data gatherers, orienting them to the observation task and coaching them on specifics. Little coaching was needed as these were training and organization development professionals with excellent interpersonal communication and observation skills. Two field office participants were at the home office site on business at the time of their interviews. The others were interviewed and observed at their locations. The general foci of the data to be gathered were three: how participants went about figuring out what their customer (e.g., boss, other department) needed; how they determined if they could meet those needs, and how they conducted themselves as they went about those two things. Within these foci the data analysis was inductive to reveal emergent themes. Initial data gathering and analysis spanned four months, from May through August, 1993. After this, a draft set of tasks was produced and sent back to the participants for confirmation and review. At the same time the draft was posted in a high traffic area for both field and home office employees--the coffee room of the training department--for review and input. This is a common practice in quality improvement that allows for participation by a wide variety of individuals (Akao, 1990). Conflicting revision input, where it occurred, was resolved through telephone conferences with the affected participants.

Results and Discussion

The process of establishing customer requirements takes place almost anywhere; from the lunch table in the employee cafeteria to the snow-blower shed in a remote location. It is performed face-to-face in group meetings and on the telephone. The entire process, described in the steps below, may occur in a single meeting with the customer or it may take many meetings. In some cases it depends on the complexity of the output produced. For example, the data processing systems designers at the home office had many meetings with field personnel and the home office departments that supported the service line in order to bring on-line a reservation system. The designers, in turn met with programmers who were their suppliers, and so on.

The steps in the process listed below are generic in that they are used in formal and informal settings and with internal and external customers. Planning a customer requirements meeting (Step 1) for a particular type of external customer required reviewing a multi-page document which sales personnel must use without sounding "like a police interrogation team," as one participant put it, to capture needs for a complex system of services. For a particular internal customer, planning required nothing more than mentally noting the questions to be asked in a brief telephone call. The steps in the process of establishing customer requirements at Company X appear in a flow chart in Figure 1 and are as follows:

1. Plan customer requirements "meeting."
2. Elicit requirements from the customer.
3. Elicit from the customer the relative rank of the stated requirements.
4. Elicit from the customer the basis on which your performance will be measured relative to each of the requirements.
5. Estimate your capability to meet each of the requirements.

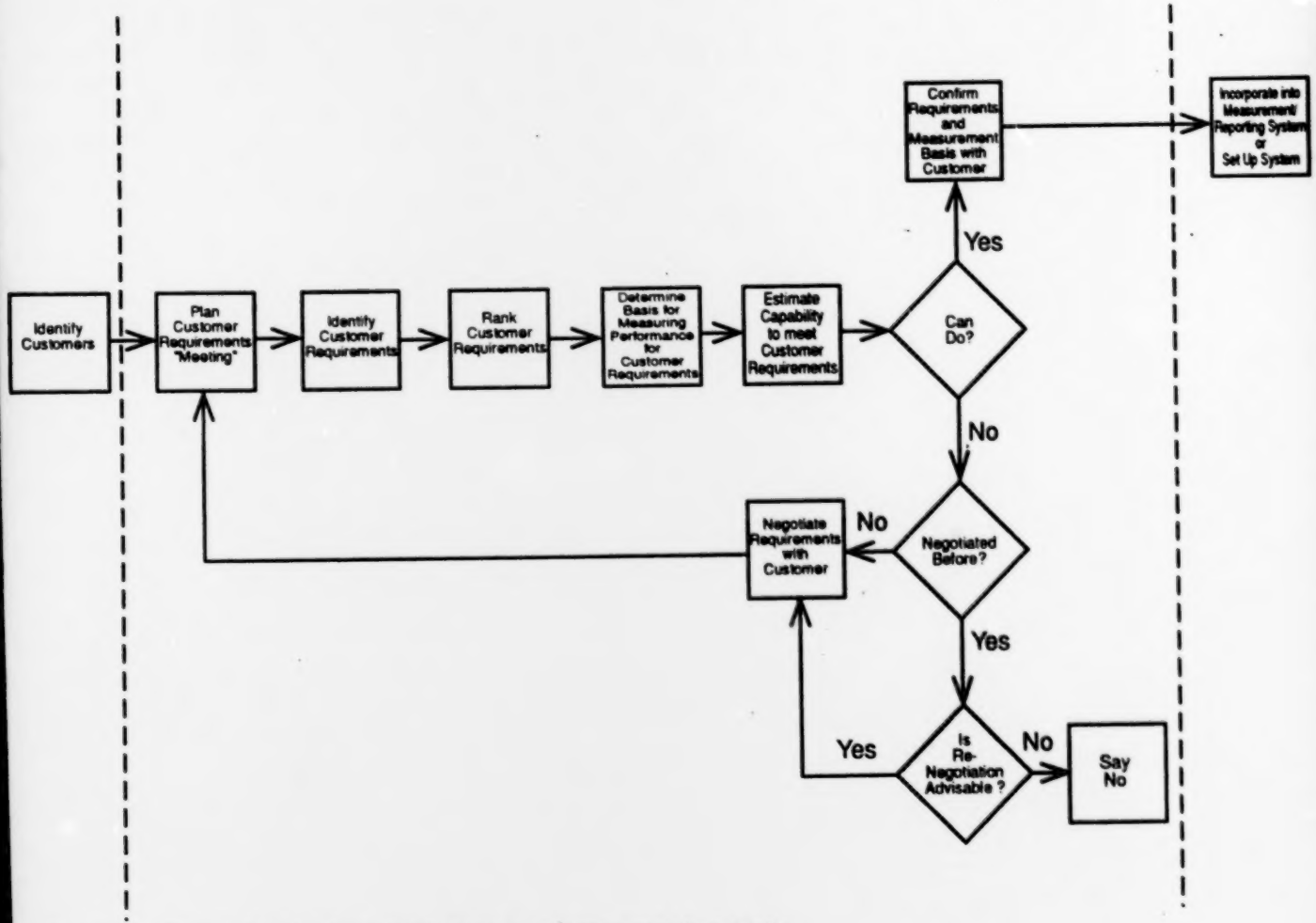

Figure 1. Flow of tasks in establishing customer requirements.

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6. If all requirements can be met, confirm them and the basis for measuring performance with your customer.
7. If all or some requirements cannot be met, negotiate them with the customer when this is possible (recycle back through process starting back at step two, above).
8. If requirements exceed capability and negotiation is not possible, say no.

The above steps do not stand alone in reality. For example, it is obvious that a prerequisite to planning for a meeting is to have someone to meet with. The process of establishing customer requirements as presented here presupposes two things: 1) that customers have been identified, and 2) that after step six, the resulting quality indicators would be input for the measuring and reporting system. These presuppositions are not included in this task analysis although they are important components of a quality improvement process. Employees had already been exposed to the quality concepts of customers and suppliers and they knew who their customers were. The measurement/reporting system was another matter and would be taken up at a later time as another component of quality improvement process training.

The output of the process ranges from the simple to the complex as well. In most cases the action plan for meeting the customer's requirements was far less sophisticated looking than a house of quality or even an A-1 quality chart. Many times the action plan was kept mentally by the supplier for simple or well known requirements, e.g., a due date for a report. Depending on the thoroughness of the supplier in establishing requirements with his or her customer, this was efficient and sufficient. At other times it was not. The issue of "what's enough?" would have to be addressed in the training.

The steps, as identified, are congruent with six of the seven steps Maddux et al (1991) propose for QFD teams in constructing a quality chart. The differences lie mainly in the "number crunching." These authors and Hauser and Clausing (1988) suggest several methods for assigning weights in determining the relative importance of requirements to the customer. They also suggest that these weights be assigned by the QFD team, based on experience with customers or on large-scale surveys. Far less often, and typically only for large-scale external customers, is this done in Company X. More often, those skilled in establishing customer requirements tend to solicit direct input from the customer. The advantage of having the customer do this is that subjective interpretation by the supplier is eliminated. Ratios of improvement are not calculated either, as is prescribed by Maddux et al (1991).

The task analysis steps also point out a phenomenon that may be indigenous only to Company X, but should be investigated by studies in other organizations. QFD authors (Akao, 1990; Hauser & Clausing, 1988; Maddux et al, 1991) do not mention it specifically, although one could infer it from the standpoint that all meetings, including ones with customers, involve negotiation. The phenomenon is that of negotiating requirements. Engaging a customer in this activity can result in establishing requirements that previously, as originally stated by the customer, could not be met. For example, in presenting what he could do for an internal customer, one participant from the home office, a mail room clerk, presented a realistic picture of what his customer could expect. He then asked if the requirements could be modified to achieve alignment with capability. His customer agreed to hold him responsible for special pick-up of express mail when requested to do so by 3:00 p.m., rather

than every day on a regular basis at 4:00. (All express mail vendors--outside suppliers--pick up their packages at the building's central mail facility between 5:00 and 5:30 p.m.)

Instructional Analysis

Instructional analysis of the tasks in establishing customer requirements was performed to identify the skills and knowledge required to perform the tasks well. The analysis follows procedures that are detailed more extensively by Gagne and colleagues (Gagne, 1985; Gagne, Briggs & Wager, 1992). Briefly, each of the tasks in the process was analyzed by this author for its knowledge and skill requirements. These subordinate learning components appear in Figure 1 and are written in a modified form of the familiar 5-part objective. The objectives listed do not include conditions ("givens") or extensive standards for performance, for example, due to the necessity for adding those contextual elements as the organizational environment dictates. For Company X, these contextual components were articulated to form the basis for training design. The objectives linked by a vertical line are hierarchical in nature with subordinate objectives below superordinate ones. Horizontal links between objectives imply no hierarchical relationship. For example, in estimating capability to meet customer requirements (see p.15), Generating an action plan requires that the learner must be able to "interpret current performance standards" and know the "components of an action plan." Instruction for either of these objectives may be taught before the other. Subordinate to interpreting performance indicators, however, are four objectives that must be learned first.

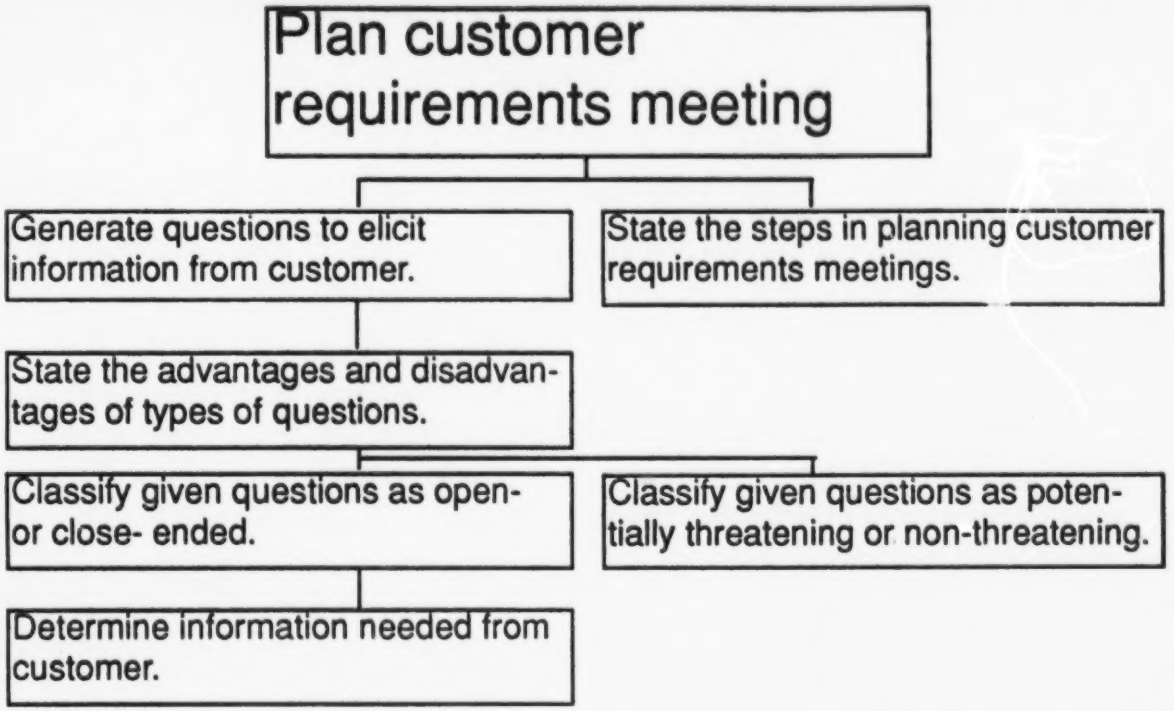
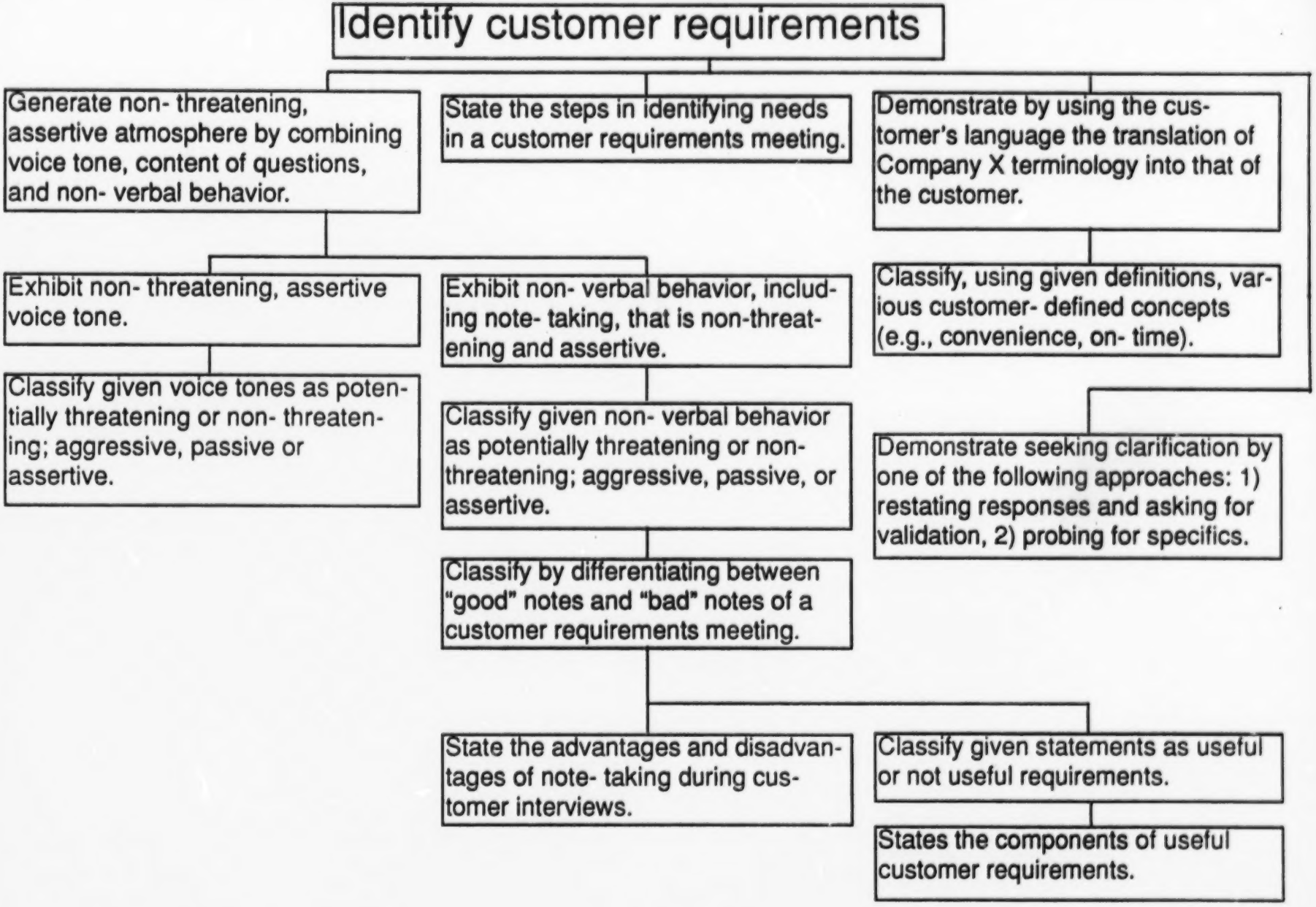
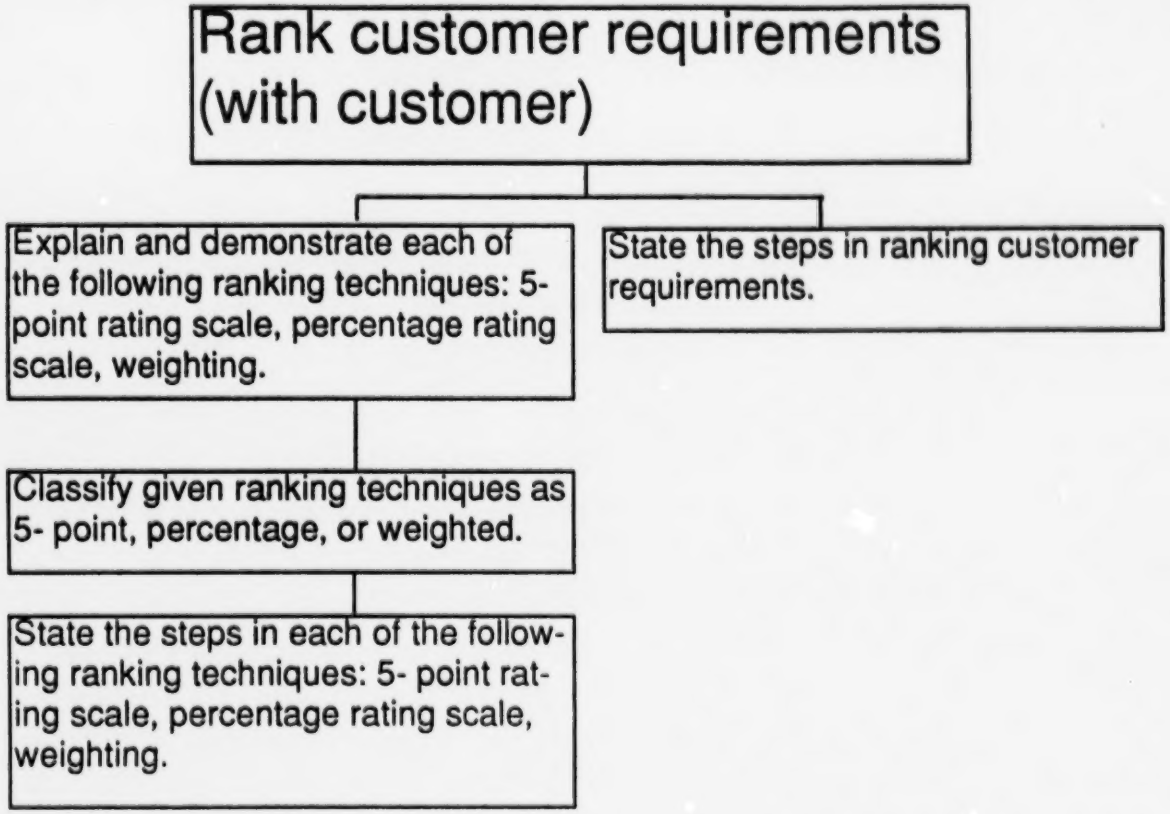

Plan customer requirements meeting
Generate questions to elicit information from customer.
State the steps in planning customer requirements meetings.
State the advantages and disadvantages of types of questions.
Classify given questions as open- or close- ended.
Classify given questions as potentially threatening or non-threatening.
Determine information needed from customer.

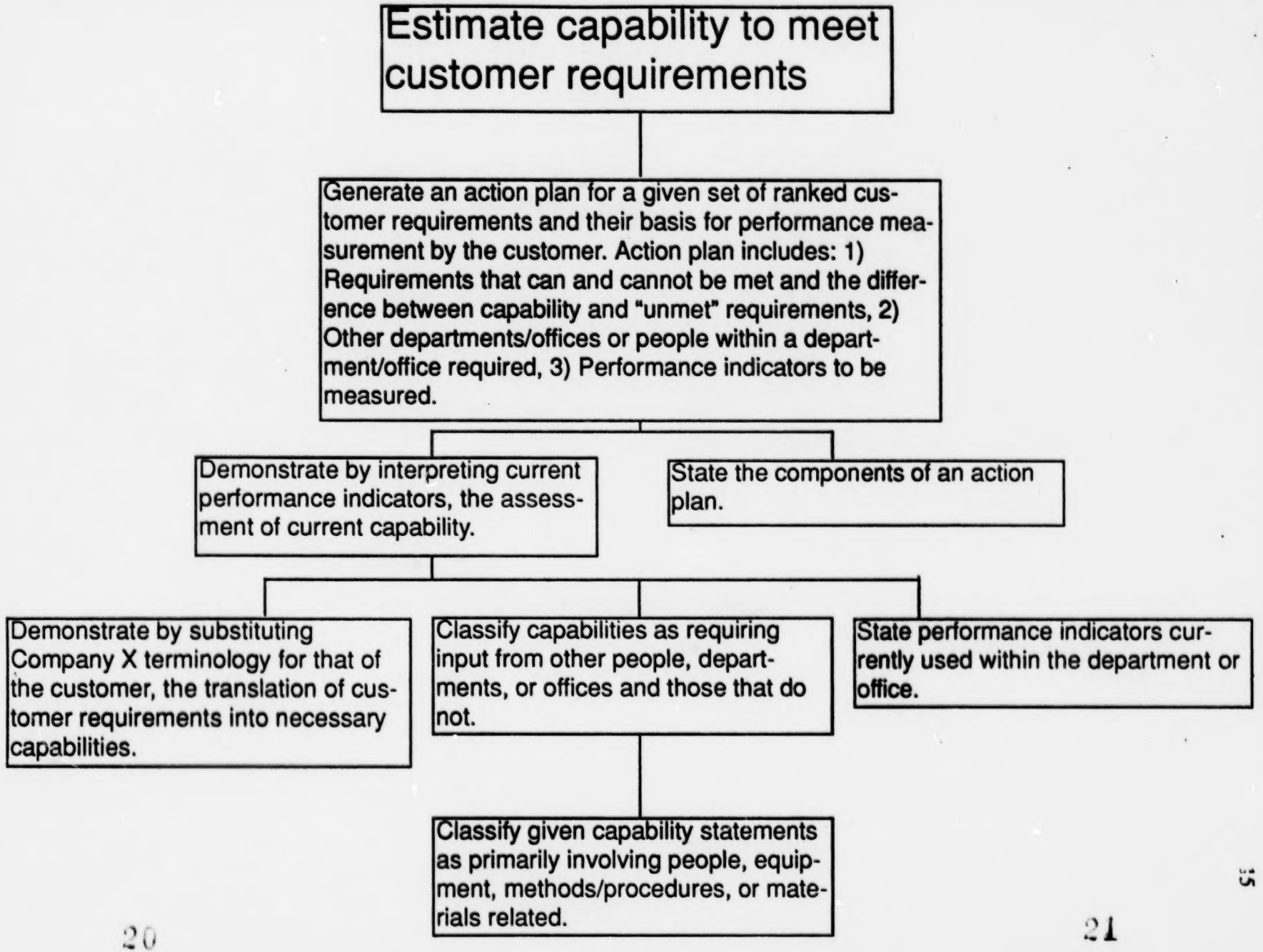
Figure 1. Instructional analysis for tasks in establishing customer requirements (includes pages 11-16).

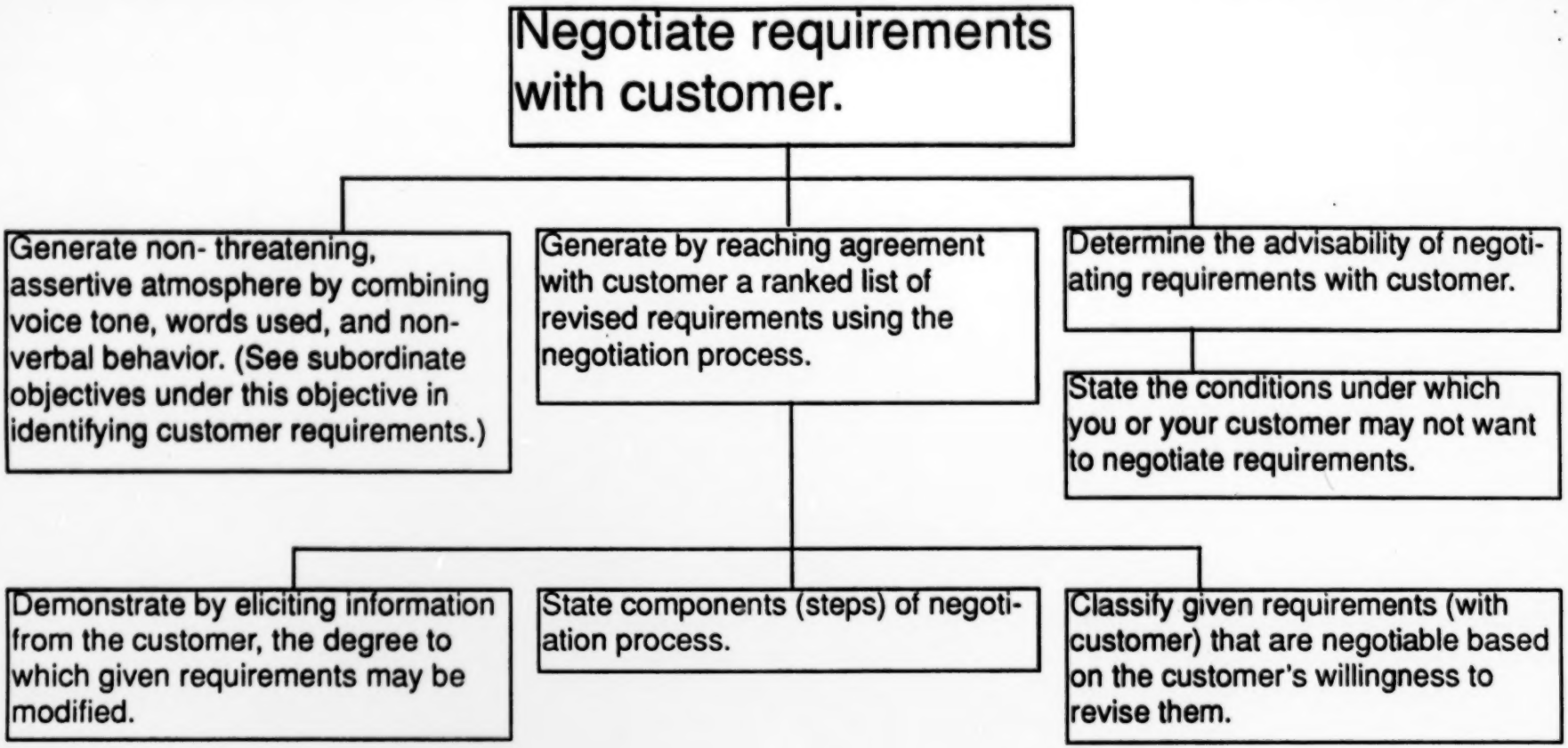

Identify customer requirements
Generate non- threatening, assertive atmosphere by combining voice tone, content of questions, and non- verbal behavior.
State the steps in identifying needs in a customer requirements meeting.
Demonstrate by using the customer's language the translation of Company X terminology into that of the customer.
Exhibit non- threatening, assertive voice tone.
Exhibit non- verbal behavior, including note- taking, that is non-threatening and assertive.
Classify, using given definitions, various customer- defined concepts (e.g., convenience, on- time).
Classify given voice tones as potentially threatening or non- threatening; aggressive, passive or assertive.
Classify given non- verbal behavior as potentially threatening or non-threatening; aggressive, passive, or assertive.
Demonstrate seeking clarification by one of the following approaches: 1) restating responses and asking for validation, 2) probing for specifics.
Classify by differentiating between "good" notes and "bad" notes of a customer requirements meeting.
State the advantages and disadvantages of note- taking during customer interviews.
Classify given statements as useful or not useful requirements.
States the components of useful customer requirements.


Rank customer requirements (with customer)
Explain and demonstrate each of the following ranking techniques: 5-point rating scale, percentage rating scale, weighting.
State the steps in ranking customer requirements.
Classify given ranking techniques as 5- point, percentage, or weighted.
State the steps in each of the following ranking techniques: 5- point rating scale, percentage rating scale, weighting.

Determine basis for measuring performance for customer requirements (with customer)

State the ways given customer requirements may be measured, specifying units of measure and measuring tools.


Estimate capability to meet customer requirements
Generate an action plan for a given set of ranked customer requirements and their basis for performance measurement by the customer. Action plan includes: 1) Requirements that can and cannot be met and the difference between capability and "unmet" requirements, 2) Other departments/offices or people within a department/office required, 3) Performance indicators to be measured.
Demonstrate by interpreting current performance indicators, the assessment of current capability.
State the components of an action plan.
Demonstrate by substituting Company X terminology for that of the customer, the translation of customer requirements into necessary capabilities.
Classify capabilities as requiring input from other people, departments, or offices and those that do not.
State performance indicators currently used within the department or office.
Classify given capability statements as primarily involving people, equipment, methods/procedures, or materials related.


Negotiate requirements with customer.
Generate non- threatening, assertive atmosphere by combining voice tone, words used, and non-verbal behavior. (See subordinate objectives under this objective in identifying customer requirements.)
Generate by reaching agreement with customer a ranked list of revised requirements using the negotiation process.
Determine the advisability of negotiating requirements with customer.
State the conditions under which you or your customer may not want to negotiate requirements.
Demonstrate by eliciting information from the customer, the degree to which given requirements may be modified.
State components (steps) of negotiation process.
Classify given requirements (with customer) that are negotiable based on the customer's willingness to revise them.

Conclusions and Recommendations

In considering QFD and the task analysis performed by the study team together, the following conclusions may be drawn. First, the implementation of any quality improvement process cannot be taken for granted once the basic concepts and problem solving tools have been learned. It cannot be assumed, for example, that an individual who can identify his or her customers can also effectively probe them, negotiate with them, and translate the results into clear, measurable requirements. Second, the basic process of establishing customer requirements is essentially the same whether one is working with internal or external customers. Complexity of the steps in the process increases with the complexity of the customer and the service sought. Third, the task analysis of establishing customer requirements at Company X extended QFD by adding the dimension of negotiation and customized QFD for the organization in its own language. Fourth, QFD extended the process for establishing requirements by adding options for ranking or weighting and graphic representation. This also informed the instructional analysis, providing alternatives that are relatively simple to learn and implement. Fifth, the processes of task and instructional analysis are, themselves, forms of QFD and take into consideration that customers (for training, in this example) may or may not articulate needs well. In our case, as it is with most suppliers of quality training, it remains the task of the designer, i.e., supplier, to identify these requirements nevertheless and build training around the learning objectives inherent in them.

In agreement with Akao (1990), this author recommends that organizations not opt for one-size-fits all approaches. This applies to training as well as organization-wide quality improvement. It is appropriate and informative to customize the approach to take advantage of the positive activities already taking place and the facilitating parts of the internal culture for the intervention to be implemented. Further investigation of the process of establishing customer requirements in other settings is called for, both to describe it more fully and to extend the theory of QFD.

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